

Control Your Lights and Appliances

Lights that go on and off, dim and brighten, all by themselves. Appliances that respond to the time of day and the presence or lack of daylight. Coffee makers that turn themselves on and off. You still can't order an "Earl Grey" (as *Star Trek's* Captain Picard does), but you can have your house obey voice commands.

This is the automated house, and your Mac is in control of it. Amazing as it sounds, the automated house isn't that difficult to create. It doesn't require ripping up anything in your house — there are no new wires. It just requires some simple, inexpensive modules plugged into your power outlets and some software on your Mac. For less than the cost of *Microsoft Office*, you can automate an entire home. This chapter looks at the scope of what's possible. How is any of this possible? Read on.

Home Automation and X10

Most of the home automation projects described in this chapter revolve around a technology called X10. You can find automation products that use infrared and radio frequency technologies, but they don't have low cost, ease of installing, and versatility of X10. With this technology, you don't have to build an infrastructure, so you can automate your rented apartment and take it all with you when you leave.

You can start with an initial investment of \$40, and build little by little as you automate more functions. There are two basic steps to automating your home: putting in the X10 equipment (small devices that plug into AC outlets) and adding software to your Mac to control and respond to the devices. You can purchase X10 modules at RadioShack and other stores, and on the Internet.

First, a taste of what you can do with X10 technology.

chapter 1

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- ☑ Home Automation Projects
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Where X10 Came From

The name “X10” is unrelated to the Unix X-11 standard, and is much older than Apple’s Mac OS X. The technology was invented by a small Scottish company, Pico Electronics Ltd. of Glenrothes Scotland in the late 1970s. For several years, Pico designed the first microprocessors for pocket calculators. The company worked on creating several other new products before they came up with the idea of digital signals over AC wires. They called their home automation technology “X10” simply because it was the tenth project they created. Pico soon formed a new company to create X10 devices, which is now called X10 Ltd.

In December 1997, the X10 patent expired and the technology became an open standard. The X10 company (www.X10.com) that Pico created is now just one of many companies that makes X10 hardware.

The Automated Home

The automated home makes events happen without you having to think about it — lights and appliances turn on and off, complicated TV and stereo systems become simple, and energy conservation saves you money. You can automatically open your drapes in the morning or shut off the coffee pot after you leave for work. You can also control items manually from anywhere in the house, and sometimes from outside of the house, from a phone or the Web. You can also set up the Mac to react to sensor readings and send out commands.

These are some of the main areas that you can automate:

- **Lighting.** Lights are the most common item automated and are probably where you will start your automation efforts. Lights will turn on just before you get home or just after you go to bed. Or, while you are out of town, have lights go on and off as if you were still in town. You also can dim lights. You can control individual lamps, as well as in-wall and ceiling-mounted lights. And because you can control lights from anywhere in the house, you can light a dark room before you step into it.
- **TV and stereo.** Complex home entertainment are, well, complex to use. You have TV, a satellite receiver, DVD player, VCR, stereo receiver/amplifier, and perhaps multiple speakers in different rooms. The automated house can simplify all of this. You can have a single button set to turn on multiple entertainment units, or have the house do it for you.
- **Security.** You can save a lot of money on traditional security services by creating your own with your automated home. You can connect door, window, and motion sensors, as well as cameras and alarms to the system. The automated home can call you or send you an email if some event is triggered, such as a smoke detector going off — this lets you call the fire department before the fire gets big enough for the neighbors to see it.
- **Water your yard only when it needs it.** You may have an automatic sprinkler system that turns on at certain times, whether you need it or not. In the automated house, your sprinklers will turn off when it starts raining. And if it has already rained, a sensor will detect if the ground is already soaked and prevent the sprinklers from starting.

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- **Phone systems.** You can use a phone as a remote control from in your house or outside of it. You can use the keypads on the phone, or use voice recognition to issue voice commands. You can also screen calls so totally that the phone won't even ring if it's from someone not on your list. You can also have your home phone call you at different numbers to alert you to various conditions, including a flood in your basement, a fire, a house that's too hot, or maybe that your tropical fish tank heater is on the fritz.
- **Regulate temperature.** An automated house can regulate temperature in different ways. You can save on energy costs by keeping the heating or cooling systems to a minimum while you're out. They would only kick in 30 minutes before you got home, so you would walk into a comfortable climate. While you're away, you can have your house contact you if it gets too hot or too cold for your pets. You can then turn on the air conditioning or heating from your remote location. But temperature regulation isn't just a matter of controlling thermostats. The house can close the draperies at certain times of the day to block the sun.

Although there are wireless add-ons (both infrared and radio frequency), the bulk of this automation is accomplished through X10 technology. This chapter will tell you what you need to know to get started on any of these projects.

About X10 Technology

X10 is a standard for controlling home automation devices over your building's existing electrical wiring. X10 transmits low-power digital pulses (representing 1s and 0s) through a building's AC power lines. The information transmitted usually consists of simple commands telling a module to switch, off, or to dim.

X10 equipment is easy to install — you often just plug a module into an AC socket and then plug your lamp or appliance into the module. The modules are inexpensive, starting at just over \$10. (There are also X10-enabled light switches and wall sockets, which we'll get into later in the section on lighting.)

The X10 modules can be receivers, transmitters, or both. (See Figure 1-1.) X10 receivers accept commands and respond by turning on or off. A lamp module could receive an "On" command through the AC power socket it is plugged into. The module contains a little switch, which opens when the On command is received, providing juice to the lamp and thus turning it on.

An X10 transmitter sends the command to the receiver connected to the lamp or appliance. A transmitter can be a hand-held keypad plugged into an AC outlet — you punch in a command, and a light goes on in another room. A transmitter can also be a sensor, such as thermostat or a motion detector.

Your Mac can also be an X10 transmitter, running X10 software and connected through a USB or serial port to an X10 interface box. Your Mac acts as a type of X10 transmitter called a controller, which means that you can program it with software. Some devices, including your Mac, can be both receivers and transmitters of X10 commands. These devices will respond to X10 commands by issuing other X10 commands.

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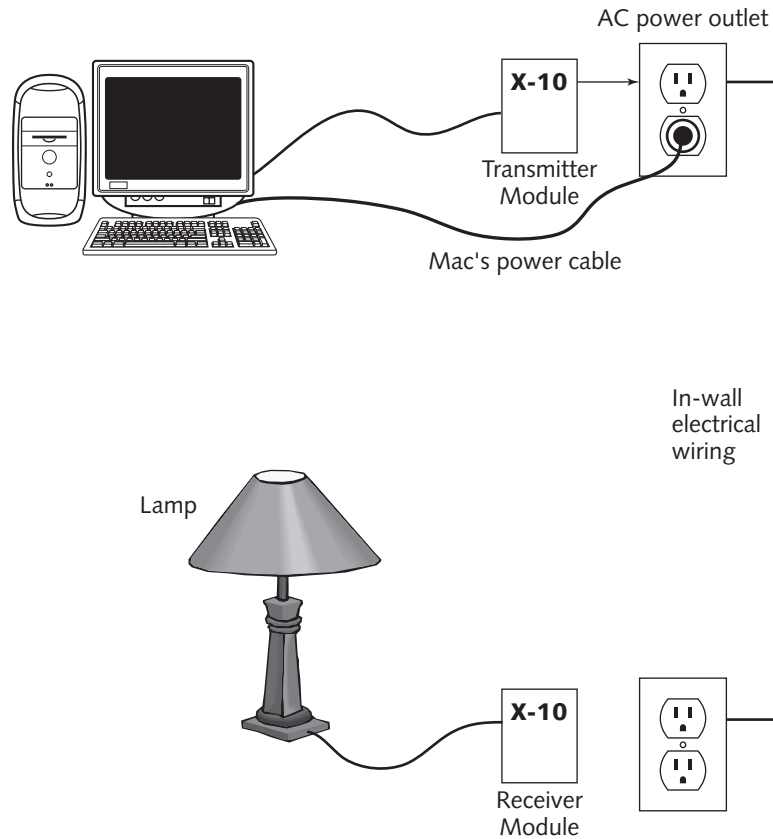


FIGURE 1-1: The basic X10 system consists of a transmitter and a receiver of commands.

Of course, you can have more than one transmitter and one receiver in your house. But when an X10 transmitter sends an On command, you don't have to have all of the lights and appliances in the house go on. The reason is that each X10 module has a unique address that identifies it as the recipient of a command. The address consists of a number from 1 through 16 and a letter from A through P (the first 16 letters of the alphabet). This gives you 16 times 16 addresses, or 256, in the form of 1A, 1B, 1C . . . 16N, 16O, 16P. Therefore, you can have a maximum of 256×10 devices in your house. The letters are called the house code; the numbers are the unit code.

For most X10 devices, you set the address manually. This is often in the form of two dials you can set with a screwdriver, one for the letter, one for the number (Figure 1-2).

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FIGURE 1-2: Many X10 modules require that you set a unique address on two dials like these.

Image Courtesy of SMARTHOME, Inc. Copyright © 2003.

Because X10 signals depend on the electrical characteristics of your home's wiring, some houses can see problems with communications between devices. Fortunately, these problems (such as electrical interference) are well known and easily fixed by plugging in inexpensive devices into a wall socket. These are described in the "Troubleshooting" section later in the chapter.

What You Need

The great thing about home automation is that it is fairly simple and inexpensive. Unlike some of the other *Mac Toys* projects, you don't need a fast Mac or a lot of hard disk space or memory. The pieces are inexpensive and easy to find. Here's what you need:

- **A Mac.** You have a choice of running the software on the modern Mac you use every day or dedicating an old Mac to the task. To get the most out of home automation, you'll want to leave the Mac running all the time.
- **Software.** Beside the Mac itself, the software is the only Macintosh-specific item on this list, and probably your most important decision. You can choose from among five X10 automation applications.
- **Computer-to-X10 interface.** You can find these for as little as \$35. However, check with your software first — each X10 application supports a certain set of specific interfaces. (See Figure 1-3.)

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- **Cable converter.** If you're using a newer Mac and an X10 interface box with USB, you don't need a converter cable. You do need a converter if your interface box has the standard X10 serial connector. You also need a converter if your Mac is an older (pre-iMac) model without USB.
- **X10 modules and sensors.** These are the X10 receivers you'll use to control lights and appliances, and the thermometers, light sensors, motion detector, and other hardware you'll use to input data into the system.
- **X10 filters.** You may need between two and five noise filters for appliances that create electrical noise. These are small boxes that plug into the wall. (See the "Troubleshooting" section later in the chapter.)
- **X10 coupler.** You may need a phase coupler device to enable devices on opposite ends of the house to communicate. (See the "Troubleshooting" section later in the chapter.)

Where to Buy X10 Gadgets

You can find X10 hardware in certain retail stores. RadioShack is probably the biggest retailer carrying X10 hardware. The company carries products from several manufacturers, and has its own branded hardware. RadioShack's Web site (www.radioshack.com) has an online catalog in the Security & Home Automation section, but you may need to use Internet Explorer to access it, as Safari didn't work to well with the site at publishing time.

There are some great Web sites where you can buy X10 products. SmartHome (www.smarthome.com) is a large site that focuses on X10 and related home automation products. In addition to offering a lot of X10 hardware and two different Mac software applications, SmartHome.com has a good deal of information about X10 technology, as well as ideas for home automation projects. SmartHome.com also sells books and videos on home automation topics.

X10, Ltd. (www.x10.com), the company that started it all, doesn't offer much in the way of Mac software, but does have a large assortment of every type of X10 module and peripheral that you could think of.

Marrick Ltd. (www.marrickltd.com) is another manufacturer of X10 and other electronic equipment, which is available for sale at the company Web site as well as other places. Marrick doesn't sell Mac software, but has links to a few software sites. You'll also find X10 products at HomeAutomation (www.homeautomationnet.com).

A good way to get started is with one of the "starter kits" that most X10 vendors offer. These are bundles an X10 computer interface, some X10 appliance modules, and software. For instance, SmartHome offers several starter kits focused in different areas, such as lighting or security, as well as general-purpose kits. In addition to the convenience of getting everything you need to start, the starter kits are usually pretty good deals, offering a discount over the cost of buying everything separately. If you're paying for software as part of a bundle, just make sure

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you get Mac software. You can also buy software and software/hardware starter kits directly from some software manufacturers. (But before you do, read the section on X10 software for the Mac later in this chapter.)

Controller Hardware

We discuss the various X10 modules throughout this chapter, but first we want to describe the hardware that will be used to control the modules. These devices can issue the standard X10 commands: On, Off, Dim (for lights), Bright (the opposite of Dim), PreDim, All Lights ON, and All Units OFF.

First up is the X10-computer interface, followed by optional hand-manipulated X10 controllers. After that, some thoughts on the Mac itself, which will be the main controller in automated home.

X10-Computer Interfaces

The basic function of an X10-computer interface is to transmit and receive X10 commands and signals, and to accept and pass along commands from and to the Mac. There is nothing Mac-specific about any X10-computer interface — they will also work with PCs. The exact model of X10-computer interface you use depends on the Mac software you want to run. Each application will work with certain pieces of hardware.

SmartHome's PowerLinc USB (\$35, www.smarthome.com/1132U.html) is the first X10-computer interface with a Universal Serial Bus (USB) port. (Figure 1-3 shows the USB port at bottom.) USB means you don't have to bother with converter cables, which can cost more than the PowerLinc. Another handy feature of the PowerLinc is that it preserves an AC outlet by providing an AC plug as a "pass-through," which you can use for any electrical device, including your Mac. The PowerLinc USB comes bundled with software for Windows — ignore it. If you want to buy the PowerLinc USB bundled with Mac software, try Perceptive Automation's Web site (www.perceptiveautomation.com/indigo/). This is the maker of Indigo, the only X10 software for Mac OS X that supported the PowerLinc USB at the time of publication. Perceptive Automation often offers discounts on the PowerLinc USB when you purchase it with Indigo.

At the time of publication, all other X10-computer interfaces used a serial connection. If you're using a Mac with a USB port, you will need *two* converter cables — one that converts USB to the old Mac 8-pin serial standard, and another to convert the Mac serial to a 9-pin X10 connector. The serial-to-serial cables are inexpensive (under \$20), but the USB converters are not. One of the best USB-to-serial converters is the Keyspan USB Serial Adapter (www.keyspan.com), shown in Figure 1-4. While other USB-to-serial converter cables can be troublesome with Mac OS X, the Keyspan has some of the best Mac OS X drivers and is seamless to use. However, at \$49 for the single-port model (USA-19HS), the converter costs more than the PowerLinc USB, and, you may need another converter cable to connect from the Keyspan to the serial port in the X10 interface. However, if you are using an older, pre-iMac model, you won't need a USB-serial converter.

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FIGURE 1-3: SmartHome's PowerLinc USB is the first X10-computer interface with USB.
Image Courtesy of SMARTHOME, Inc. Copyright © 2003.



Figure 1-4: You can use the Keyspan USB Serial Adapter to connect USB to serial X10 interfaces.
Courtesy of Keyspan.

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SmartHome offers several similarly priced, similar-looking PowerLinc models that have serial ports. X10 Ltd offers several models, including the CM-11 and the CP290, which are often included in a bundle with X10 modules and Windows software called ActiveHome. (MouseHouse's bundle of its software includes the CP290.) This is a unit that can accept downloading of commands, so you can turn the Mac off. Marrick's LynX-PLC (\$100, www.marrickltd.com/lynx105.htm) is another X10-computer interface that works with some of the software packages.

When you are shopping for X10 equipment, you will also find bigger, more expensive interfaces that are manually programmable. However, these devices are not necessary when you are using a Mac. They duplicate some of what the Mac's does, but don't give you the flexibility and capabilities that Mac X10 software can offer. However, even with a Mac, additional Hand-held controllers can sometimes be useful, as described next.

Hand-held Controllers

Your Mac doesn't have to be in charge of everything. You can use manual controllers to set certain combinations of lighting or appliances to switch on with a single button. Wired controllers such as the SmartHome Mini Controller (\$12, see Figure 1-5), which plug into an AC outlet, let you do things like turn all the lights on or off, dim lights, and start or stop appliances, all without getting out of bed.



FIGURE 1-5: Manually operated X10 controllers (such as this SmartHome MiniController) plug into an AC outlet.

Image Courtesy of SMARTHOME, Inc. Copyright © 2003.

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Other controllers are more sophisticated, with more buttons. The wall-mounted controller in Figure 1-6 lets you set combinations of lighting and dim settings for different occasions, such as morning, dinner, and watching TV. The SmartHome KeypadLinc 8 (\$80) replaces an in-wall light switch or dimmer switch and is programmable.

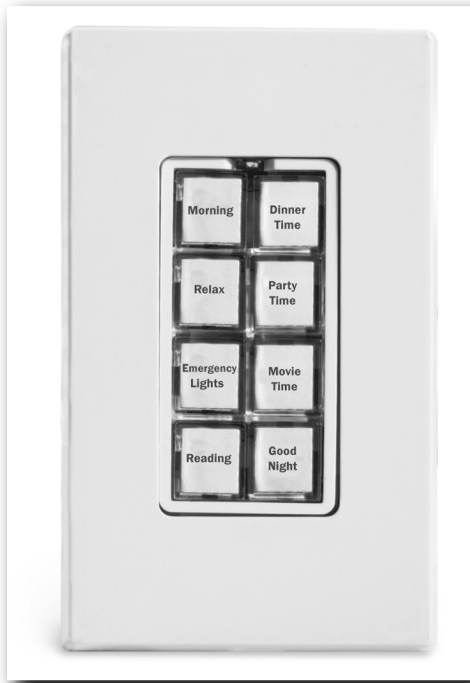


FIGURE 1-6: A wall-mounted controller lets you select combinations of settings with the press of a button.

Image Courtesy of SMARTHOME, Inc. Copyright © 2003.

You can also find X10-compatible hand-held wireless remotes, some small enough to put on your keychain. These are not strictly X10 devices, but are X10 compatible, in that they use infrared or radio frequency signals through the air to communicate to an X10-compatible receiver plugged into the house wiring. Leviton's Universal Remote Control gives you X10 commands, such as On, Off, Dim, and Bright.

Which Mac to Use

The question of which Mac to use comes down to a choice between using your regular Mac for X10 controlling or dedicating one for the purpose. Running X10 control software doesn't take a lot of processing power or hard disk space, making an old Mac a viable candidate, even if it is running Mac OS 7, 8, or 9. However, the lack of intensive hardware requirements means that you can run X10 software on your Mac OS X with your other applications without slowing anything down. Mac OS X gives you a slightly bigger list of software to choose from, in that

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one of the best X10 applications does not run on OS 8 or OS 9. (See the section on software a little later in this chapter.)

Another thing to keep in mind is that you'll get more automation from your Mac if it is running all the time. Some software lets you download the Mac's commands to a module, but with those kinds of commands, you don't really need a Mac at all—you could punch similar commands directly into a controller.

A drawback to older Macs is that they are more prone to hard drive failure; power supplies can also fail. The flip side to that argument is that you can also buy a used pre-iMac model for less than the cost of a new hard drive.

If you are going to use software designed to be on all the time, you might want to use a Mac model that is quiet. If your Mac has a separate monitor, you can usually turn off cathode ray tube monitors without affecting the Mac software. This will extend the life of the monitor and save on energy costs.

Prepping an Old Mac

If you're using a relatively modern Mac, there's nothing you need to do in terms of preparation—just install your X10 software, plug in a computer interface, and start setting up your automated house.

For an old Mac (one running Mac OS 9 or earlier), there are a few things you can do to it to prevent problems:

- Clean out the hard drive. Delete unnecessary files and folders or applications that you will never use. If the hard drive is close to being full, it will slow performance.
- Clean out the System folder. Use the Extensions Manager control pane to turn off extensions that you aren't using. An easy way to do this is to use the pop-up menu to select "Mac OS only." This will turn off any extensions that didn't come with the Mac.
- If you aren't using networking, turn off AppleTalk and File Sharing using the control panels. This will boost performance.
- Run one or more disk utilities, such as Apple's Disk First Aid (found on your Mac's system disk) or Norton Utilities. If the utility finds a problem, run it again. Keep running it until it doesn't find a problem.
- If you are having problems, reinstall the operating system from your system CD (or floppy disks).

You can upgrade the operating system on your old Mac to a later version, as long as you don't go too far—more advanced versions of Mac OS can bog down older Macs.

If your Mac is running System 7, don't upgrade it to Mac OS 8 unless your X10 software requires it. A Mac of this vintage will do better with System 7.5.5, which was a stable version. System 7.6 was also stable, but used more memory and doesn't work on all models. (Apple has a list of old models at that do and don't run on 7.6 at <http://docs.info.apple.com/article.html?artnum=8970>).

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If the Mac is running Mac OS 8, don't install Mac OS 9, which uses a lot more memory. If you have a pre-iMac (beige) Mac with a four-digit model number (such as Power Mac 7500), you can use Mac OS 8.6, which was a solid version. If your Mac is a pre-PowerPC Mac (with a three-digit model number, such as Quadra 700), then Mac OS 8.5 is the latest version you can use.

If you have Mac OS 9.0, the latest you should upgrade to is 9.0.4. Later versions were created to accommodate Mac OS X Classic mode.

Apple has some old system software updates at www.info.apple.com/. These are updates that were originally free updates, and not major updates.

X10 Software for Mac

The Mac X10 software you decide to use will determine which interface modules you can run, which Mac operating system you can use, and which computer interfaces you can use.

There are five X10 applications: In order of power and features, starting with the most powerful, there are Indigo, Thinking Home, Xtension, Mouse House, and CP290 Director, costing from \$90 to \$10. Three of these, XTension, Mouse House, and CP290 Director, are only available for Mac OS 8 and 9 or earlier, though XTension and Mouse House will run in Mac OS X Classic.

Thinking Home, MouseHouse, and CP290 Director let you download commands to an X10 interface, the C11 or the CP290 from X10, Ltd. However, these interfaces are mere schedulers—you can do much more with Mac as controller, such as generate X10 commands in real time, have the system contact you when events occur, and let you control your system remotely through the Mac. The real power is in programs like Indigo and Xtension, which require you to keep the Mac on all the time.

Indigo

Indigo from Perceptive Automation (www.perceptiveautomation.com/indigo/) is the newest—and the most powerful—of the X10 applications. It is easy to use and is flexible, with features going beyond simple timed events. Indigo can send you email when certain events occur (such as a power failure), and you can control the system with email. You can also set Indigo to start heating your hot tub just by sending it an email message. Indigo also lets you control your X10 system using a Bluetooth-equipped Sony Ericsson phone. Indigo supports AppleScripts, but there is much you can do in the way of scripting using menus and buttons that you don't have to write any AppleScript code to come up with some advanced triggering and control mechanisms.

Launched in 2003, Indigo was written specifically for Mac OS X—there is no Classic version, which means that you can't run it on an old Mac. At the time of publication, Indigo was the only X10 application that supported the PowerLinc USB computer interface from SmartHome, which means it doesn't need a USB-to-serial converter cable. It also supports SmartHome's

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PowerLinc 1132A, a serial version that does require the converter. It also supports CM-11 (sometimes branded as ActiveHome) from X10 Ltd, and Marrick's LynX-PLC. Indigo does not download commands to the CM-11 interface module, but can do things that the module can't. For instance, you can have it automatically send you an email message when an event occurs. If you have an interface module that Indigo supports, X10-computer interfaces, you can try a fully functional copy of Indigo free for 30 days.

Indigo uses a simple user interface to create complex control situations. On the left side of the main window (see Figure 1-7) are four buttons labeled Devices, Trigger Actions, Time/Date Actions, and Group Action. With Devices selected, you see a list of X10-controlled devices, such as lamps and appliances, and X10 sensors, such as motion detectors or thermostats. Indigo gives you some samples (shown in the figure), but you can add your own with the New button. Double-click a device to enter its X10 address and other settings. To manually control a device, click once to select it and use the controls at the bottom. In Figure 1-7, we dimmed a light.

Click the second button down, and you get a list of *trigger actions*—actions that are responses to events. Instead of writing scripts, you choose items from pop-up menus. When you first install Indigo, you'll see a list of sample trigger actions, including “power failure email,” “office light on,” and “aquarium motion.” Double-click an action, and you get a dialog with three tabs: Trigger, Condition, and Action (see Figure 1-8). The Trigger tab lets you define what causes the action. The Type pop-up menu lets you select triggers such as an X10 command, the change in a device's state, a received email, an application starting up, a power failure, and others. For each of these you select the circumstances in which the trigger is activated.

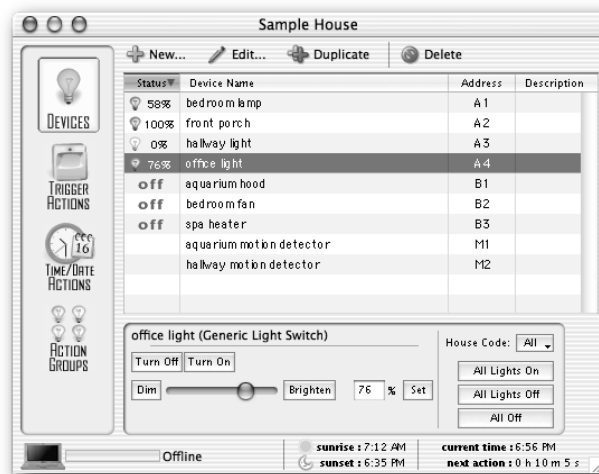


FIGURE 1-7: Indigo lets you send X10 commands manually through the Devices pane. Here, we are dimming a light.

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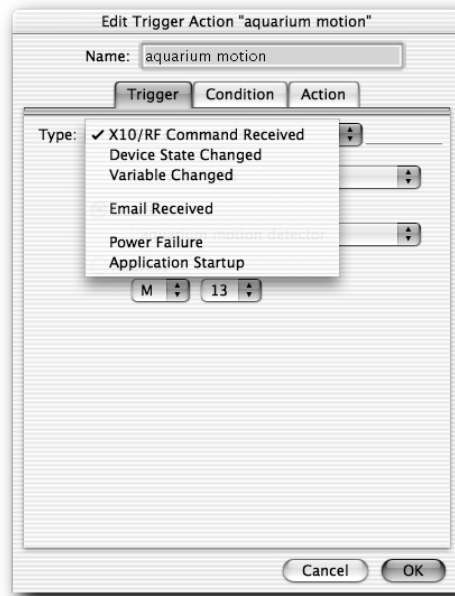


FIGURE 1-8: Editing a trigger action in Indigo lets you specify exactly what causes the trigger to fire and what will happen as a result.

The Condition tab puts further limitations on the trigger by letting you assign a time of day and specify whether various variables are true, false, greater than or less than, or follow other Booleans. Under the Action tab, you'll tell Indigo what to do in response to the trigger. The Type pop-up menu (shown in Figure 1-8) lets you select various types of actions, which you will specify after you select it from the menu. Included in this menu are send email, a way to notify yourself when something happens, and AppleScripts, which let you further customize your system.

Back in the main Indigo window, the third button is called Time/Date Actions and lists items that you can schedule for regular occurrence, such as turning lights on and off and dimming them. However, you can set conditions on these, so that they will or won't occur if certain actions are performed or certain sensors get a specific reading. For example, you can tell Indigo to start your sprinklers at 3 P.M. unless your outdoor rain sensors tell Indigo that it is raining.



One of the powerful features of Indigo is that instead of setting an action to occur at a specific time, you can set it to occur at sunrise and sunset.

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The last of the four buttons, Action Groups, lets you create settings for a combination of devices. You might create an action group called “Dinner Party” that has certain lights in multiple rooms turned on and dimmed to preset levels, with some of your other automatic actions disabled.

Another interesting Indigo feature is the ability to use a Bluetooth-enabled Sony Ericsson mobile phone as a remote control. To accomplish this, Indigo uses the Salling Clicker application from Salling Software (<http://homepage.mac.com/jonassalling/Shareware/Clicker/index.html>). Salling Clicker lets you run your Mac from the phone or a Palm hand-held. With Indigo’s scripts, you can also use the phone to control Indigo, and therefore your house.

Indigo comes with extensive documentation in the Help menu. Perceptive Automation also has a helpful user forum at its Web site (www.perceptiveautomation.com/phpBB2/index.php), where you can post questions and read tips.

Thinking Home

Thinking Home (\$39, www.alwaysthinking.com) from Always Thinking is now Mac OS X native. There are also versions available for earlier versions of Mac OS. Thinking Home doesn’t measure up to Indigo in several ways. For one, the interface is a bit old, requiring a lot of typing, such as when you have to type to enter times to turn devices on. And unlike Indigo, you can’t see the status of your devices all at once. More importantly, Thinking Home doesn’t generate X10 commands based on input from devices. It only schedules events, such as turning appliances on and off, and dimming lights. The upside to being simpler is that Thinking Home can download these simple commands into an X10-computer interface, letting you shut off the Mac. If your X10 needs are very simple, Thinking Home might work for you (Figure 1-9).

While the Mac (and Thinking Home) is running, you can expand the functionality a bit by running a macro, a sequence of commands that is enacted by a single command. This enables you to set multiple devices at once. You can activate this command by voice if you have Apple’s PlainTalk installed and turned on. (PlainTalk is included on the Thinking Home CD.) However, some of the supported X10-computer interfaces, such as the CP290 and the FireCracker, don’t support macros.

Thinking Home has no USB support, so you will have to buy a USB converter such as the Keyspan device described earlier. Thinking Home does support a number of different X10-computer interfaces from X10, Ltd. This includes the CM-11 and CM-12 (both called ActiveHome), and the IBM Home Director versions, called HD-11 and HD-12. Thinking Home also supports the CP10, CM-10, CM-17, CP290, as well as the FireCracker, a small wireless X10-computer interface that sends radio signals to a transceiver that plugs into the wall. If you have a choice, Always Thinking recommends the CP290 as the most reliable interface to use with Thinking Home.

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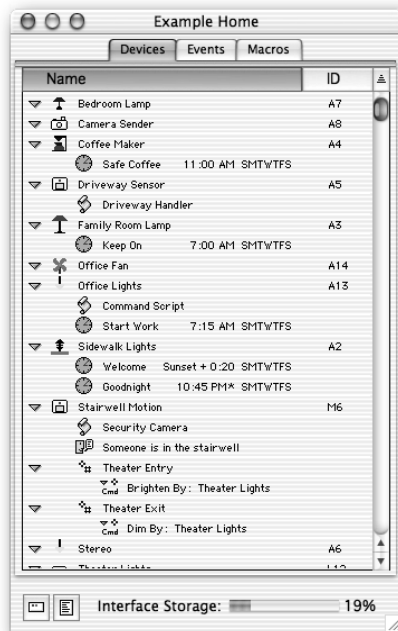


FIGURE 1-9: Thinking Home can do basic scheduling of X10 events.

XTension

XTension (\$90) from Sand Hill Engineering (www.shed.com) was once the top-rated X10 software for Mac. Readers who are familiar with X10 will argue that XTension's capabilities are closer to Indigo than Thinking Home, and therefore deserves to be ranked ahead of Thinking Home. However, at the time of publication, there was no Mac OS X version, and the developer had not committed to creating one. XTension didn't support USB X10-computer interfaces, but did support the CM11 (also called ActiveHome), three different models of Marrick's LynX, and an older interface called the Home Intelligence Corporation Two-Way.

Like Indigo, XTension does not download information to an interface, but it can generate X10 commands based on input from sensors and other X10 devices — again, one of the reasons to use a Mac instead of a manually operated programmable X10 controller. However, setting up XTension to generate X10 commands is quite a bit more difficult than doing so with Indigo, because XTension requires you to create scripts using AppleScript syntax and special AppleScript verbs from XTension. You don't exactly need to be a programmer, though it's more trouble than choosing items from menus, as in Indigo. If you want to generate X10 commands on Mac OS 7.1 through 9.x, XTension is the most capable tool.

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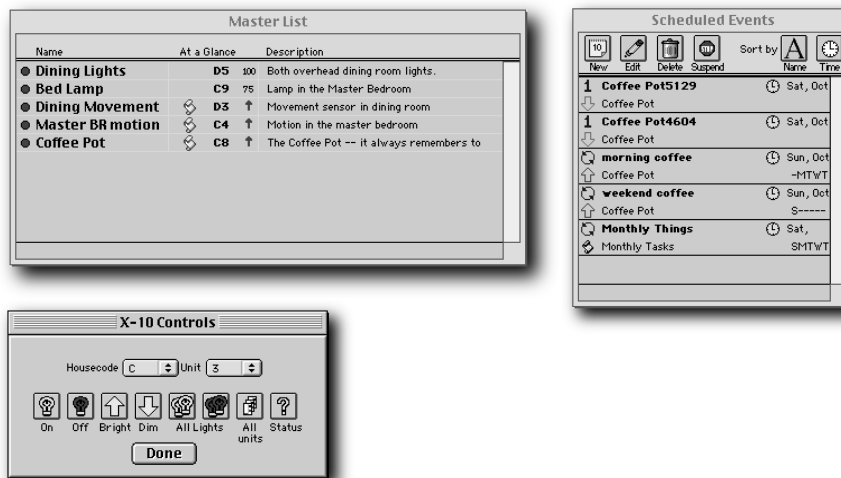


FIGURE 1-10: If you are running your X10 automated home on Mac OS 8 or 9, XTension is a good choice.

XTension's interface starts with a Master List of devices (Figure 1-10) that you can directly control with a separate X-Controls dialog. Like Indigo, XTension's Master List displays the current status of devices, including how much a light is dimmed. It also shows whether there is a script attached to it. The Scheduled Events window is where you configure a schedule for a device and attach a script to it.

Another interesting feature is that you can import a PICT graphic that is representation of your house. (You have to draw your own map in a drawing program.) Once it has been imported, you can drag items from the Master List to the map drawing. Icons appear on the map, which you can use to control the devices. For example, double-clicking on a lamp icon turns it on or off.

XTension comes with a detailed electronic manual, and the Sand Hill Web site is worth a look for all of its information on X10.

MouseHouse

At \$34 MouseHouse (www.mousehouse.net, Figure 1-11) is an inexpensive application that will run in System 7 or 8. MouseHouse runs with the ActiveHome or CP290 computer interface. Although it hasn't been updated for more recent Mac operating systems, MouseHouse is similar in some ways to Thinking Home. It can download commands to the computer interface and thus let you turn off the Mac. And like Thinking Home, MouseHouse doesn't generate X10 commands on the fly, but does let you create macros.

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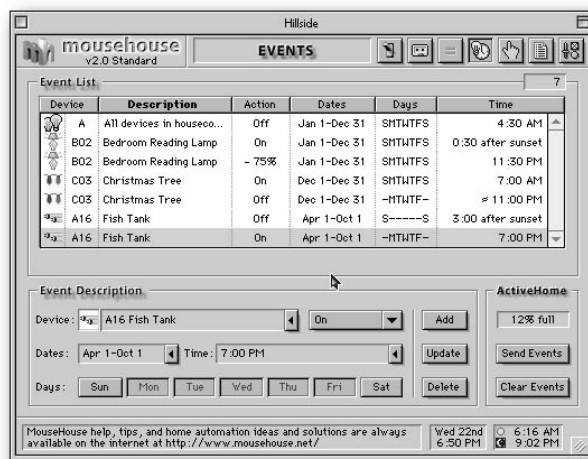


FIGURE 1-11: MouseHouse can schedule events in this window.

The MouseHouse Web site offers several starter kits for sale bundled with the software. The site also has some good information about X10 and X10 devices.

CP290 Director

If you have a really old Mac — such as one running System 7 — and a CP290 X10 computer interface, and you want some really cheap software to experiment with, you might give a try to CP290 Director (<http://thewoodwards.us/sw/CP290Director/index.shtml>). This \$10 shareware application runs only on System 7 through Mac OS 8.6. Because it isn't completely compatible with Mac OS 9, it's not a good idea to run it in Mac OS X Classic. The other limitation is that it works with only one X10 interface, the CP290 from X10, Ltd.

Home Automation Projects

There is almost no limit as to what you can automate with a Mac and X10 equipment. This section will give you a taste of what some of the possibilities are and a look at some of the hardware. This includes X10 receivers for controlling appliances and lights, sensors for recording the environment, and peripherals that can add to your X10 system. We start with lighting, which make up the most popular types of X10 projects.

Lighting

Lighting is a good way to start automating your house. It's easy, fast, and inexpensive to set up and get immediate results. There is also a lot you can do with automated lighting. If you wake

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before dawn, you can have lights come on in the morning in different parts of the house, then have them go off at different times during the day and at night. If you have fancy in-wall lights, you can control them, too, by having a particular combination of lights switch on with a single push of a controller button.

If you think creatively, there are other types of lighting you can control. For instance, by automating the lamp on your fish tank, you can give your fish the same amount of light every day. You can turn your Christmas tree lights on and off at a specific time or have them turn on when a motion sensor in the hallway detects that you've come home. And since your Mac knows what time it is, and the software knows when the sun will set today, so you can have lights go on at sunset, or shut off after sunrise.

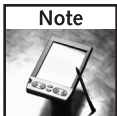
For your lighting projects, you can use X10 lamp modules that plug into wall sockets, as well as special X10 switches and wall sockets. Each of these lighting devices is rated for a certain power level, typically 300 to 400 watts. You should be sure to stay within these levels. However, X10 devices for lighting should *not* be used for appliances. The reason is dimming.

Dimming

The basic X10 lamp modules that plug into wall sockets are different from those used by appliances in one important feature — they support dimming. When an X10 module is told to dim, it reduces the power delivered to incandescent bulbs. The standard lamp module will allow you to set the brightness between 0 and 100 percent. Assigning a number of 75 to a 100-watt bulb will get you approximately the brightness of a 75-watt bulb. By setting lighting levels differently for different times of the day or for different purposes, you can dramatically increase the versatility of your home's lighting.

Using your Mac software or a hand-held X10 controller, you can dim an incandescent light downwards from full brightness — that is, go from 100 to 50. You can also increase the brightness from another lever — say, from 40 to 75. The only thing you can't do is start from the off position and gradually get brighter. That's because X10 will first turn a light on at full brightness and then dim it. This means that you can't have the light wake you up by gradually getting brighter without going to full brightness first.

However, it is important to note that X10 dimming works *only* with incandescent bulbs — it won't work with fluorescent lighting. In fact, if the lamp has its own transformer, as do many compact fluorescents and halogen lights, the X10 dimming function could damage the lamp and the X10 receiver module. Similarly, appliances with transformers or motors (which is most appliances) can also be damaged by the X10 dimming function. You should never use lamp modules on fluorescent or halogen lights or on any kind of appliance.



Note

You should be able to use an X10 module to dim halogen lights that do not have a transformer. However, since there are many different types of halogen lights, and it isn't obvious if they do or don't contain a transformer, it's safest to just avoid using X10 lamp modules with halogen lighting.

You can still use X10 appliance modules to turn standard fluorescent and halogen lights on and off. There is no problem if the lamp already has a built-in (non-X10) dimmer — when the X10

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appliance module is switched “on,” the built-in (non-X10) dimmer will work. However, X10 appliance modules may not work with compact fluorescent bulbs. In this case, there is no potential for damage, but the appliance module may sense a current flow that it interprets as an On command, which means that it might keep turning the light on.



Tip

No space for an X10 lamp module at your AC socket? Try using an X10 light module that screws into a socket, such as X10's SocketRocket (\$20, www.x10.com/products/x10_lm15a.htm).

X10 Wall-switches

If you have a lamp or a ceiling or wall-mounted light that is turned on and off by a wall switch, a plug-in lamp module isn't going to work. Ideally, what you would want is a situation where your Mac can turn the light on and off, but you can still use the wall switch when you walk into the room. Yes, you *could* have a completely automatic house, where motion sensors in every room turned on the light when you walked into it, but if the wall switch was in the off position, it wouldn't matter what your motion detectors saw.

Unless, that is, you were using an X10 wall-switch in place of your standard wall switch. This is a wall switch (like that shown in Figure 1-12) that looks and acts like your old switch, but also responds to X10 commands. These cost more than ordinary wall switches, but still start at under \$10. There are several types of X10 switches for different wiring situations, such as two-way or three-way, and for different dimming situations. Some switches let you turn the lights on and off, but let your Mac do the dimming. Others will let you manually dim the lights at the switch, as well as let the controller dim it.

You may remember from the previous section that X10 dimming is a problem for fluorescent and halogen lamps and for appliances. You don't want to plug a vacuum cleaner into an AC outlet that is controlled by a dimming switch. For these situations, you can get X10 wall switches that don't dim — they just turn on and off, and don't respond to X10 dimming commands. These are the equivalent of plug-in appliance modules.

With X10 wall switches, you'll need to take care that you don't exceed the maximum power level for the switch. This is typically 500 or 600 watts.

X10 Wall Outlets

If you just don't like the look of an X10 module plugged into your wall socket, there is another way to go — replace the wall socket with an X10-controlled wall socket. You can find ones that are the equivalent of lamp modules (that is, they dim) and ones that are equivalent to appliance modules (they don't respond to X10 dimming commands).

You can also find “split” wall sockets — the top outlet is X10-controlled, while the bottom socket is a standard (always on) socket. This is handy for plugging in your vacuum cleaner or appliances that you don't want your Mac to control.

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Replacing a wall switch with an X10 switch is a do-it-yourself task. If you've replaced a light switch before, X10 is no different. Be sure to shut off the circuit breaker that controls the circuit. If you can't figure it out, shut off the power to your home. Pull the original switch out, and note how it is wired—which colored wires go to which connectors. Then look at the directions that come with the X10 switch. The wiring differs depending on whether the room is wired in a one-way switch or two-way configuration. A book on basic home wiring from your local hardware store should help. SmartHome has wiring diagrams at its Web site for different configurations. (For instance, see www.smarthome.com/2383.html.)

Example: Motion-Triggered Porch Light

As an example, let's look at how you would set up a light to turn on when motion is detected. There are many uses for this, from lighting your backyard for security to having the lights go on automatically when you enter a room.

We'll use Indigo to set the conditions of when this will happen. Since we don't need the light to turn on in the daytime, we'll set the software to only turn on the light after sunset. Since this is a hallway light at the entryway of the house, we'll also set the light to go off 10 minutes after the last motion is detected.



FIGURE 1-12: X10 wall switches (such as this SmartHome SwitchLinc) respond to your Mac and let you manually turn the lights on and off.

Image Courtesy of SMARTHOME, Inc. Copyright © 2003.

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First, install the motion detector in the hall. These are usually mounted on the wall or ceiling or in a corner. Next, enable that light to be X10-controlled with a plug-in lamp module, X10 switch, or other device. Make sure that you set an X10 address for both devices. (For the motion detector, you usually set the X10 address on the transceiver that plugs into an AC outlet.)

Now launch Indigo and configure the motion detector and the light:

1. Click the Devices button at the top left of Indigo's main window.
2. Click the New button at the top.
3. In the Create New Device dialog that appears, provide a name for the motion detector.
4. In the Type pop-up menu, choose Motion Detector.
5. Set the X10 address. The dialog should look like Figure 1-13.
6. Click the OK button. You'll now see the motion detector in the device list.
7. Click the New button to create a device for the light.
8. In the Create New Device dialog that appears, provide a name for the hallway light.
9. In the Type pop-up menu, choose the type of X10 control method. The pop-up menu lists several types of plug-in lamp modules and the Socket Rocket screw-in module. We'll select Generic Light Switch to indicate an X10-controlled wall switch.
10. Set the X10 address.
11. Click the OK button.



FIGURE 1-13: Setting up Indigo for a motion detector.

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Next, you'll need to define a trigger action. This will tell Indigo to turn on the light when motion is detected. First, you define the trigger (receiving input from the motion detector). Next you set the Condition (after dark). Finally, you set the action (turn on the light). Here's how:

1. Click the Trigger Actions button at the left of Indigo's main window.
2. Click the New button at the top.
3. In the Create New Trigger Action dialog that appears, give a name for the trigger action, such as "Hall motion detected."
4. In the Type pop-up menu, choose X10/RF Command Received. (This refers to the X10 command received from the motion detector.)
5. In the Received pop-up menu, choose "On." (This refers to the "On" X10 command that will be received from the motion detector.)
6. Click Device button to select it. From the pop-up menu, select the name you gave to the motion detector. (The dialog will look like the one in Figure 1-14.)
7. Set the conditions under which Indigo will turn the light on. Click the Condition tab.
8. Select the button next to "If dark, after sunset." (Indigo knows what time the sun sets each day.) This will prevent the light coming on during the day.

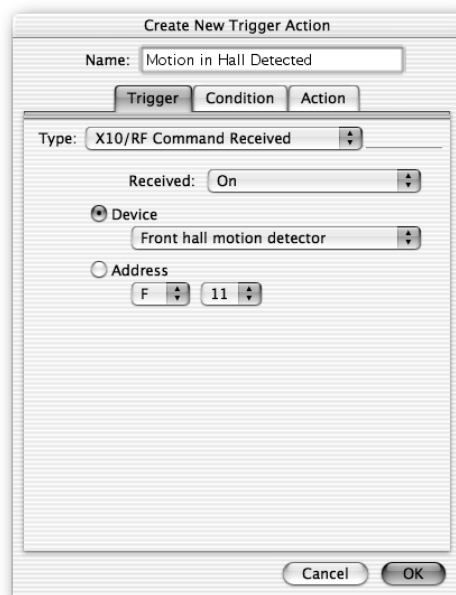


FIGURE 1-14: Creating a new Trigger Action begins by telling Indigo what will trigger the event.

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9. Click the Action tab to tell Indigo what to do when it hears from the motion detector.
10. From the Type pop-up menu, choose Send Device Action.
11. From the Action pop-up menu, choose Turn On.
12. From the Device pop-up menu, choose the name you gave to the light (Front Hall Light in our example).
13. Finally, tell Indigo to shut the light off after a time. Click the check box next to “Auto-off after” and type 10 in the Minutes box.

That’s it. If you want to have your Mac say something at the time of the action, you can type a phrase in the Speak field. (See Figure 1-15.)

Click OK when you’re finished.

Security

You can use your Mac and X10 to make your home more secure in a lot of ways. The previous example of using motion sensors to turn on lights could be used for security. An outdoor motion sensor can pick up a person moving near a door or window and turn on lights on the outside and inside. You can also use your X10 system to make your home look and sound occupied while you are out for the day or for the week. This section presents some ideas of what is possible.



FIGURE 1-15: Defining the action in Indigo.

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Sensors for Security

There are several types of sensors that you can use as your eyes and ears when you aren't around. They cost more than the X10 appliance and lighting modules previously described, but will be a lot less than having a security company come in and install a full-fledged security system.

Motion Detectors

Most consumer motion detectors use infrared technology to look for heat moving across its field of view. You'll want to make sure you get an X10 motion detector — one that responds to motion by sending out an X10 signal. (For instance, there's the SmartHome Version II Wireless X10 Motion Sensor, www.smarthome.com/4086.html.) Usually, a motion detector sends a wireless signal to a transceiver plugged into a wall socket. The transceiver sends the X10 signal to your Mac.

There are indoor motion detectors and more expensive outdoor models built to withstand the weather. If you have a cat wandering around the house all day, you can also find “pet-immune” motion detectors that ignore objects that are the size of a cat or a dog.

Open Door/Window Sensors

These are sensors that consist of two parts, one on the door and one on the door jam. When the door opens, the two parts separate, and the sensor sends out an X10 signal. You can use this signal to send you an email, turn on a surveillance camera, or turn on a light. Using Indigo, you can have an open door activate an action group doing all of these things.

Not all sensors are related to security. For instance, you can get rain-and-snow detectors to tell your Mac when not to water your lawn.

While You're Away

There are simple things you can do to enhance security while you are out of the house. On the idea that thieves would much rather burgle an empty house, the object is to make it look like someone is home.

If you're going on a trip, it's easy to set your Mac to turn on some lights at sunset. This should include lights at the front door and several windows. You can also add sound via a radio, or with a TV, which also adds the flickering light — a nice touch of realism if the glow of your TV is visible from the outside. For later in the evening, set your Mac to turn off the TV and lights in different rooms at different times, as you might do when you are at home.

You can also use motion sensors to give the impression that someone is home. For instance, you can have an outdoor motion sensor activate a series of events, turning on lights in a sequence to make it appear that you are moving toward the front door. Backyard sensors can activate outdoor floodlights.

If someone does break in, you can use motion detectors to trigger events to further give the impression that someone is in the building. Turn lights on when doors are opened, or start cameras rolling. You can even attach an alarm to an X10 appliance module to try to scare an intruder away. If you do, you should have it set to turn off after a while.

Video Surveillance

Video surveillance can be a part of your X10 system. The handy part about this is that you don't really need 24-hour per day surveillance (if you do, you should contact security professionals). With your do-it-yourself Mac-controlled system, you can set a motion detector or open-door detector to start one or more cameras rolling when someone comes to the door.

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X10, Ltd. offers cameras that work well for this purpose. For instance, the Xcam2 (www.x10.com/products/x10_vk45a.htm) is a small, wireless camera that transmits its video to a video receiver that is connected to your VCR. The system uses X10's VCR Commander interface with your VCR, to start recording, and to stop recording after the motion detector stops detecting motion for 5 minutes.

Troubleshooting

The X10 system operates as a guest on your building's AC power lines. As such, it is subject to the electrical characteristics of your electrical system. There are several common problems you can easily overcome by adding special X10 modules. If your devices are not responding to commands, you may have one of these problems.

Interference and Attenuation

If you're having problems with devices not turning on or off when they are supposed to, or working intermittently, you may have one of two problems caused by appliances — noise and device attenuation. Fortunately, both problems have the same fix.

Interference occurs when an appliance adds electrical noise on the line. This noise can confuse X10 receivers. Noise-inducing appliances include refrigerators, devices with motors (such as plug-in fans, hair drivers blenders, or vacuum cleaners), and some fluorescent lights.

The fix is to add a signal filter to the noisy appliance, but first you have to find out which appliance is causing the problem. You can do this by turning off appliances one at a time while the X10 system is running. It's helpful here to setup a script on the Mac to continually act, such as turn a light or a radio on and off while you are doing this. If you have more than one noisy appliance (such as those mentioned in the preceding paragraph), you may want to turn them all off to start with. When you locate a noisy appliance, plug it into a device called a signal filter and plug the noise filter into the wall. Signal filters tend to run between \$30 and \$50 each.

Attenuation occurs when an appliance filters out your X10 signals because it thinks the signals are noise. The effect is the same as a noise-producing appliance in that the X10 receivers stop responding or respond intermittently. Appliances that can attenuate X10 signals include some big-screen televisions, cable and satellite receivers, and some stereo equipment. Equipment related to your Mac can also attenuate X10 signals. These include printers, power supplies for notebook computers and cell phones, universal power supplies, surge protectors, and higher-end power strips. (Cheaper power strips don't attenuate X10 signals.)

Troubleshooting for attenuation is a bit more complicated, because it is not enough to turn the devices off — you'll have to unplug them to remove their effect on the power system. Plugging offending devices into a noise filter can fix the problem because it isolates the device from the system.

Two-phase Problems

Another common problem with X10 systems occurs in houses wired as a two-phase 220- (or 240-) volt system. The symptoms are that X10 devices in one section of the house don't seem to respond

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to devices in another section. Within the two halves, everything seems fine. When this occurs, you are probably seeing a lack of communication between devices on the two separate phases of a two-phase 220- (or 240-) volt system. Each phase is 110 (or 120) volts.

The fix here is a device called a phase coupler (sometimes called a coupling capacitor or a signal bridge). It joins the two phases, allowing X10 signals to cross between them.

One way to test for this problem is to look for a 220-volt appliance, such as an electric oven, range, stove/stop, or an electric dryer (not a gas a drier) — basically, appliances that use a lot of juice. Now, turn on your 220-volt appliance. If your X10 system suddenly works, then you need a phase coupler. Turning on a 220-volt appliance effectively joins the two phases, accomplishing the same thing as a phase coupler.

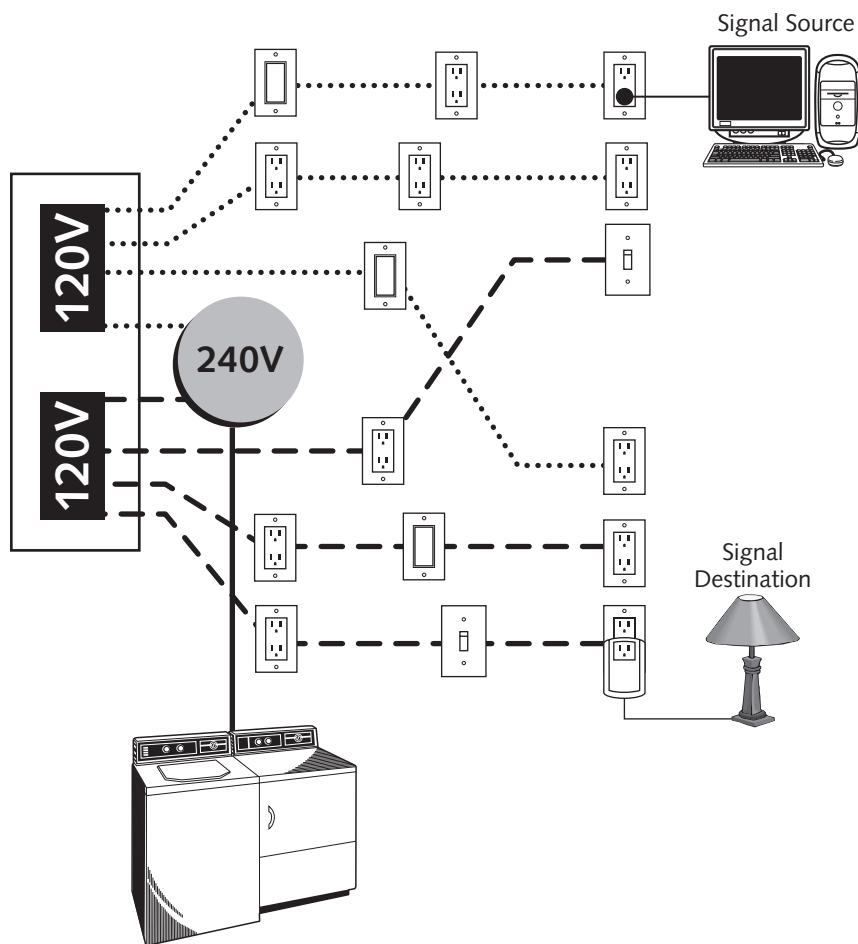


FIGURE 1-16: When a 220- (or 240-) volt appliance is turned on, it acts as a bridge between the two 110 volt phases. A phase coupler can do the same thing.

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There are two types of phase couplers — one that plugs into the 220- (or 240-) volt socket that your electric drier or oven is plugged into. (SmartHome's Signalinc, shown in Figure 1-17, is such a device.) This type of coupler is a pass-through device, letting you plug your appliance into it. You can tell a 220 (or 240) volt socket because of its size, which is bigger than a standard three-pronged outlet, as you can see from Figure 1-17.

If you don't have a 220-volt outlet in your house (perhaps because your major appliances run on natural gas), you can use a hardware phase coupler. This type of coupler sits just outside your homes' breaker box, and is connected to two circuit breakers in the breaker box. If you've ever wired circuit breakers before, it's not too difficult to install. If not, get an electrician to install it for you.

Weak Signals in Big Houses

If you've tried the "oven test" and still can't get X10 transmitters and receivers at opposite sides of a house to communicate, you may have another problem — the house is too big for the X10 signals to travel from one end to another. That is, the X10 signals degrade over the distance. You can solve this problem with an X10 signal amplifier, which boosts the signals that X10 transmitters are sending. As with other X10 devices, you plug a signal amplifier into a power outlet.



FIGURE 1-17: A phase coupler such as SmartHome's Signalinc can get X10 devices on two sides of your home to communicate with each other.

Image Courtesy of SMARTHOME, Inc. Copyright © 2003.

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“Wireless” Intercoms and X10

Many of the home automation Web sites sell “wireless” intercoms for homes that actually work on a principle similar to X10 devices. That is, they use your home’s in-wall electrical wiring to transmit voice. There are also some baby monitors that use in-wall wiring. However, these types of devices are not compatible with X10 automation devices. In fact, they will interfere with and block X10 signals while in use.

Fortunately, when the intercom isn’t being used, the X10 transmitters and receivers will function normally. To make sure that these intercom or baby monitors don’t block your X10 system all the time, don’t leave such a device in a permanent transmit mode.

Communications systems that are truly wireless—that is, they communicate through the air—don’t affect X10 equipment.

Modules Turn on When They Shouldn’t

A particular light turns on the same time every day, even though you don’t have it set that way. This problem is the opposite of the previous problem, in that X10 signals are traveling too far—in fact, your neighbor’s X10 transmitters are sending signals to your receivers. The solution is to change the house code (that’s the letter code) of your controllers and the modules. If the problem persists, there are so-called house-blocking filters you can install.

However, this problem is pretty rare, because the chances that you have a close neighbor running X10 are slim to begin with. The neighbor also has to have one of the 16 house codes set to the same one that you’re using. In addition, the neighbor has to be fairly close to you and on the same pole transformer, a possibility in an apartment or condo building, but less likely in detached houses.

There are also one-time events—voltage spikes and dips—that can trigger standalone X-10 controllers into sending commands. However, this doesn’t happen when your Mac is the controller.

Summary

You can make your Mac the controller of a home automation system to control lights and appliances around the house. The most common way to do this is through the X10 system, which transmits commands through your home’s electrical wiring. Here are the key things you should remember about Macs and X10:

- Think about the software you want to get along with the X10-computer interface. Each software package only supports certain interfaces.
- If you’re using a fairly modern Mac, using a USB interface can save you some money.
- Indigo from Perceptive Automation is the best software for Mac OS X.

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- If you have an old Mac running Mac OS 7, 8, or 9 lying around, it can work just fine for controlling your X10 system. XTension is your best bet for software on a pre-OS X Mac.
- The X10 dimming command should only be used on incandescent lighting. Don't use X10 lamp modules for appliances or fluorescent or halogen lights.
- Plug appliances into appliance modules in order to control them.
- There are some common communications problems with X10 that can be solved by plugging in a few devices into AC outlets.